ACRIN Digital Mammographic Imaging Screening Trial Informatics Infrastructure

C.R. Welsh[1], B. Young[1], V. Gopalakrishnan[1], I Mahon[1], S. Sabina[1], C. Gatsonis[2], E. Pisano[3], M. Yaffe[4]

[1]American College of Radiology, Philadelphia, PA

[2]Brown University, Providence, RI

[3]University of North Carolina, Chapel Hill, NC

[4]University of Toronto, Canada

Abstract

- Digital Mammographic Imaging Screening Trial (DMIST)
  - Study enrollment goal: 49,500 Women
  - Study duration: 18 Months
  - Study aim: Compare digital to film screen
  - Study participants: Four manufacturers and 30 institutions

Overview

- ACRIN - American College of Radiology Imaging Network (www.acrin.org)
  - New cooperative group sponsored by ACR
  - Funded by the National Cancer Institute (NCI)
  - Focused upon conducting cancer research utilizing innovations in diagnostic imaging
  - Currently with 6 clinical trials open and 9 in various stages of development

Overview cont.

- DMIST
  - Specific aim – Compare digital technology with standard screen film technique
  - Utilize 4 manufacturers – GE, Fuji, Fischer and Lorad
  - Enroll 49,500 patients over 18 month period
  - Collect digital images electronically via the Web
  - Collect films via courier/Digitize at ACR
  - Collect clinical data electronically via the Web
  - Develop and implement complete Quality Assurance for all imaging

Informatics Infrastructure

DICOM Image Transfer Mechanism
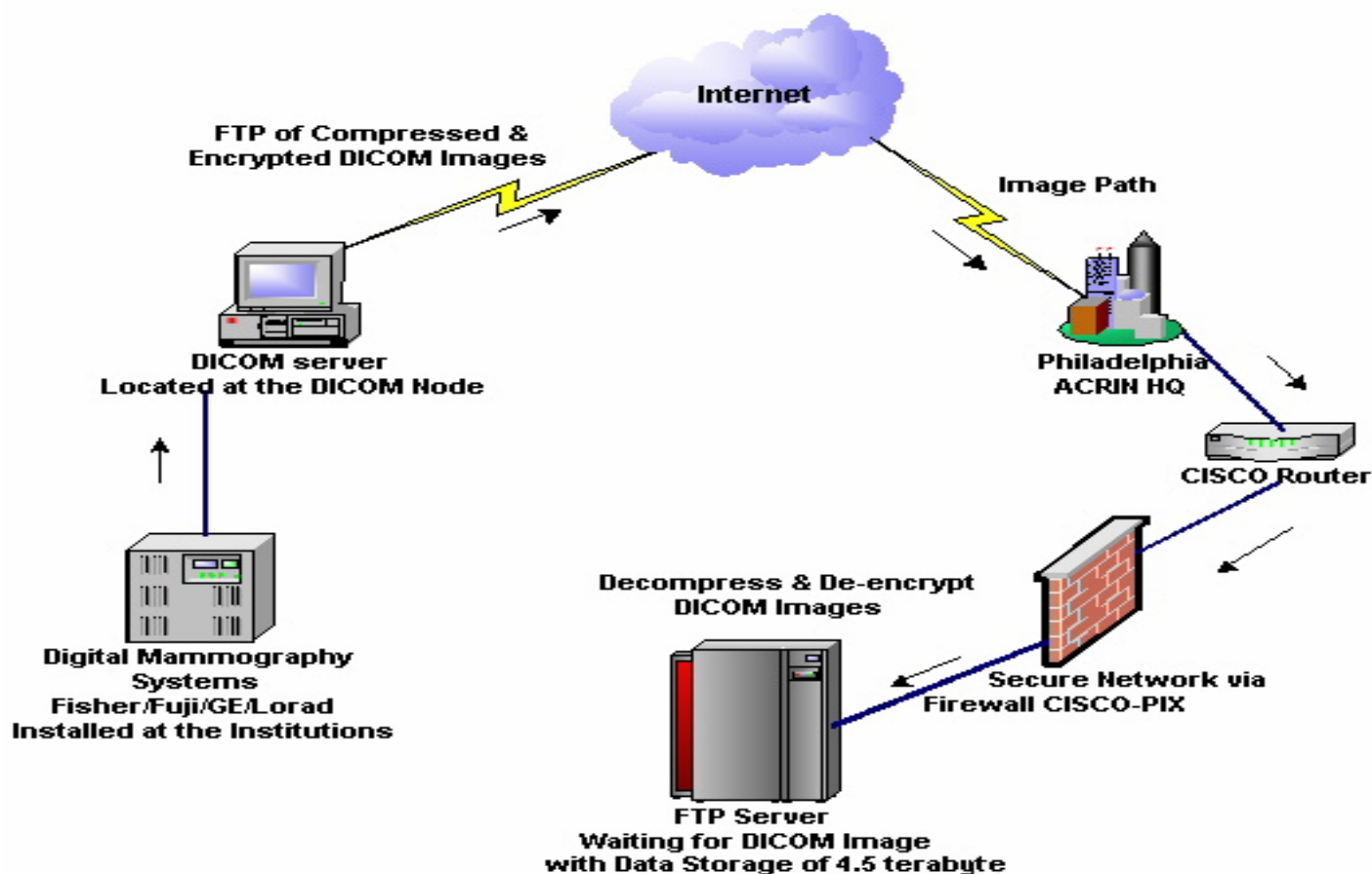
Network Hardware and Software

- Central Server Systems – Hardware and Software
  - Fibre channnel Gbit Networked multi-processor Win2000 Servers
  - MS 2000 SQL Server – Imaging and clinical databases
  - CISCO PIX secure firewall
  - FTP Web image collection
  - Silver Stream Web clinical data collection
  - DS3 Web connection
  - Total Storage: 6 Terrabyte online SAN (Storage Area Network)
  - DVD offline storage/permanent archive

Network Hardware and Software

- Central Server Systems - Functions
  - Clinical Data System
    - MS SQL2000 Clinical Database Architecture
      - Patient registration
      - Data form calendar generation
      - Clinical data storage
      - Statistical analysis interface
    - Silver Stream Web Interface
      - Online database interaction
      - Dynamic data form generation

Network Hardware and Software

- Diagnostic Imaging System
  - Central System
    - MS SQL 2000 patient database
    - DICOM server
    - Clinical database interface
    - Image transmission receiver

Network Hardware and Software

- Remote Client Systems – Architecture and Functions
  - Remote Clinical Data Collection Systems
    - Pre-configured notebook computers
    - Java applet/XML data format
    - Online patient registration and data entry
  - Remote Image Acquisition Systems
    - MS Access patient database
    - DICOM server
    - Image collection w/ DVD backup
    - DICOM image re-identification
    - Image transmission

Summary

- Obstacles and challenges
  - Institutional variables
  - Web data interchange
- Results
  - Near paperless clinical trial management
  - Successful Web-based image collection